

Appl. No. 09/889,090
Amendment and/or Response
Reply to Office action of 19 July 2004

Page 3 of 9

Amendments to the Claims:

A listing of the entire set of pending claims (including amendments to the claims, if any) is submitted herewith per 37 CFR 1.121. This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

1-2. (Canceled)

3. (Currently amended) A liquid crystal displaying apparatus ~~according to claim 1~~ characterized in that capable of displaying a color image, comprising:

a liquid crystal panel in which each main pixel unit including a red sub-pixel, a green sub-pixel, a blue sub-pixel and a luminance-enhancing sub-pixel, and
calculation means for calculating digital output values R_o , G_o and B_o for
driving said red sub-pixel, said green sub-pixel and said blue sub-pixel, respectively,
from digital input values R_i , G_i and B_i respectively for said red sub-pixel, said green
sub-pixel and said blue sub-pixel and a predetermined digital value W for driving said
luminance-enhancing sub-pixel so that a relationship of $R_i:G_i:B_i =$
 $(R_o+W):(G_o+W):(B_o+W)$ is satisfied, said values R_i , G_i and B_i being obtained from
an input color image,

wherein said digital value W is obtained in accordance with a function represented by a formula $W = f(Y_{max}, Y_{min})$ where Y_{max} and Y_{min} are a maximum value and a minimum value, respectively, of said digital input values for said red sub-pixel, said green sub-pixel and said blue sub-pixel.

4. (Original) A liquid crystal displaying apparatus according to claim 3 characterized in that said function represented by said formula $W = f(Y_{max}, Y_{min})$ is a function which monotonously increases as a value of said Y_{max} value or said Y_{min} value becomes larger.

Appl. No. 09/889,090
Amendment and/or Response
Reply to Office action of 19 July 2004

Page 4 of 9

5. (Original) A liquid crystal displaying apparatus according to claim 3 characterized in that said formula of W is given by a function in which said Y_{min} is a variable with said Y_{max} being a constant and in that said function represented by said formula $W = f(Y_{max}, Y_{min})$ is a function which monotonously increases as a value of said Y_{min} becomes larger.

6. (Canceled)

7. (New) A display device comprising:

a plurality of picture elements,

each picture element including a plurality of color sub-pixels and a white sub-pixel,

a decoder that is configured to receive a plurality of input color values and to produce therefrom a plurality of color pixel values that are used to drive corresponding color sub-pixels, and white pixel values that are used to drive the corresponding white sub-pixels,

wherein

the decoder is configured to:

determine a minimum color value and a maximum color value for each picture element,

produce the color pixel values for each picture element dependent upon the input color values and the maximum color value, and

produce the white pixel value for each picture element based on the minimum color value.

8. (New) The display device of claim 7, wherein

the decoder is configured to produce the color pixel values for each picture element dependent also upon the white pixel value.

Appl. No. 09/889,090
Amendment and/or Response
Reply to Office action of 19 July 2004

Page 5 of 9

9. (New) The display device of claim 8, wherein
the decoder is configured to produce the white pixel value for each picture element dependent also upon the maximum color value.
10. (New) The display device of claim 9, wherein
the white pixel value is $\leq Y_{min} * Y_{max} / (Y_{max} - Y_{min})$ when $Y_{min} / Y_{max} \leq 0.5$,
and
the white pixel value is $\leq Y_{max}$ when $Y_{min} / Y_{max} > 0.5$,
where Y_{min} , Y_{max} corresponds to the minimum color value and the maximum color value, respectively.
11. (New) The display device of claim 10, wherein
each color pixel value corresponds to $C_i * (W + Y_{min}) / Y_{max} - W$,
where C_i , W , Y_{min} , and Y_{max} correspond to the input color value, the white pixel value, the minimum color value and the maximum color value, respectively.
12. (New) The display device of claim 7, wherein
the decoder is configured to produce the white pixel value for each picture element dependent also upon the maximum color value.
13. (New) The display device of claim 12, wherein
the white pixel value is $\leq Y_{min} * Y_{max} / (Y_{max} - Y_{min})$ when $Y_{min} / Y_{max} \leq 0.5$,
and
the white pixel value is $\leq Y_{max}$ when $Y_{min} / Y_{max} > 0.5$,
where Y_{min} , Y_{max} corresponds to the minimum color value and the maximum color value, respectively.

Appl. No. 09/889,090
Amendment and/or Response
Reply to Office action of 19 July 2004

Page 6 of 9

14. (New) The display device of claim 7, wherein
each color pixel value corresponds to $C_i(W+Y_{min})/Y_{max} - W$,
where C_i , W , Y_{min} , and Y_{max} correspond to the input color value, the white pixel value, the minimum color value and the maximum color value, respectively.
15. (New) The display device of claim 7, wherein
the decoder is configured to provide the color pixel values for each picture element such that a ratio of the color pixel values to each other corresponds to a ratio of the input color values to each other.
16. (New) A method of determining a set of output values for driving sub-pixels of a pixel based on input color values, comprising:
determining a minimum color value and a maximum color value based on the input color values,
determining each output color value of the set of output values based on the corresponding input color value and the maximum color value, and
determining an output white value of the set of output values based on the minimum color value.
17. (New) The method of claim 16, wherein
determining each output color value includes
determining each output color value so that a ratio of each output color value to each other corresponds to a ratio of each input color value to each other.
18. (New) The method of claim 16, wherein
determining each output color value is also based on the output white value.
19. (New) The method of claim 16, wherein
determining the output white value is also based on the maximum color value.

Appl. No. 09/889,090
Amendment and/or Response
Reply to Office action of 19 July 2004

Page 7 of 9

20. (New) The method of claim 16, wherein
determining each output color value includes
calculating $Co = Ci \cdot (W + Ymin) / Ymax - W$,
where Co , Cl , W , $Ymin$, and $Ymax$ correspond to the output color value, input
color value, the white pixel value, the minimum color value and the maximum color
value, respectively.